

Remarks

The outstanding Office Action includes an objection to claim 9. The Examiner's suggested amendment to claim 9 is appreciated and has been adopted. In view of the amendment to claim 9, it is understood that the objection will be withdrawn.

Independent claim 10 is amended to correct antecedent and to correct language.

The outstanding Office Action includes a rejection of claims 1-20 under 35 U.S.C. § 103(a) over International Publication No. WO 00/47695 to Ellingsen (see also U.S. Patent No. 6,660,158) and U.S. Patent No. 2,454,466 to Le Roi. This rejection is traversed.

Independent claim 1 is directed to a cracking process. The cracking process is carried out in a cyclone reactor and in a riser with varying diameter and with atomization nozzles under the influence of a rotating and turbulent fluidised energy carrier in the form of fine grained minerals. The fluidised energy carrier in the form of fine grained minerals are put in motion from a regenerator operated at a temperature of 450° to 600° through two exit lines with outlet under the level of a fluidised bed and are transported to the riser by combustion gases in a fluidization reactor.

Independent claim 10 is directed at a cracking unit. The cracking unit includes a cyclone reactor and a riser of varying diameter and with atomization nozzles, an inlet of the cyclone reactor is provided in the lower part of the reactor, in order to bring the particulate energy carriers into an upward circulating movement with large sheer and centrifugational forces, a perforated fluidising plate situated approximately half a diameter from the bottom of the regenerator over a plenum for the regeneration of the particulate energy carrier, and a heat exchanger provided in the fluidised bed of the particles in the regenerator, in order to control temperature.

Ellingsen describes a catalytic cracking process wherein the cracking takes place in a reactor under the influence of a rotating fluidized bed catalyst and compressed gases and/or steam is injected to effect movement of the catalyst bed. See, for example, Ellingson (U.S. Patent No. 6,660,158) at column 6, lines 19-28.

The present invention provides an improvement over the process described by Ellingsen. The present invention provides that the cracking takes place in a riser of varying diameter. As a result, accelerating and retarding energy carriers (catalyst particles) collide with atomized droplets of oil which undergo instant vaporization with subsequent cracking. Ellingsen does not describe a cracking process wherein cracking is carried out in a cyclone and in a riser of varying diameter and with atomization nozzles. The outstanding Office Action at page 3, paragraph 5, appears to refer to U.S. Patent No. 6,660,158 (Ellingson) at Figure 1, column 4, lines 41-44, and column 6, lines 40-45. This portion of Ellingson, however, does not support the contention raised in the outstanding Office Action.

Ellingsen discloses a process wherein the cracking takes place in a reactor under the influence of a rotating fluidized bed catalyst. The fact that Ellingsen mentions that the regeneration system may be designed in a different manner does not imply that Ellingson suggests a different design.

Le Roi is directed at overcoming the problem of after-burning in the regeneration of a spent catalyst by intermittently or substantially continuously injecting a non-combustible vaporizable liquid into the dilute catalyst phase in the line or lines leading from the first cyclone separator. The only example of a non-combustible vaporizable liquid provided by Le Roi is water. Where uncontrolled after-burning does occur, Le Roi provides for injection of large amounts of water into the dilute phase leading from the first cyclone, in addition to that normally introduced as necessary during regeneration. The vaporization of the liquid water absorbs heat and reduces the temperature in the dilute phase.

Le Roi thus sets out to solve an entirely different problem than the one solved by the present invention. It would not have been obvious for a person skilled in the art, with the knowledge of Le Roi to arrive at the present invention. It would also not have been obvious for a person with knowledge of Ellingsen (US 6,660,158) to combine Ellingsen's teaching with that of Le Roi, to arrive at the present invention.

Furthermore, Le Roi discloses a process quite different from the process according to the present invention. The fact that a different process operates in the same temperature range as the present invention, seems to be quite irrelevant.

The outstanding Office Action at page 7, lines 1-3, recognizes that "Ellingson... does not specifically disclose the details of working mechanism of a nozzle." It should be understood that this is a further difference between the present invention and Ellingson. The Examiner's attention is directed to the specification of the above-identified patent application at page 13, the last paragraph, and Figure 3. The Examiner's attention is additionally directed to claim 9. No explanation has been provided in the outstanding Office Action that supports a rejection of dependent claim 9.

It is additionally pointed out that the Office Action states, at several locations, that the process of Ellingson provides for cracking in a riser of varying diameter. For example, see the outstanding Office Action at paragraphs 13 and 14. This is simply not a correct statement and the outstanding Office Action fails to support this contention.

On page 8 of the Office Action the Examiner states that Applicant's Figure 1 and Ellingsen's Figure 1, both have risers ((F) and (O) respectively) with uniform diameters. It is pointed out that this argument is based on simplified drawings. The drawings are included to give the reader a general idea of the stages, and the sequence thereof, of the process. The drawings must be interpreted in view of the specification, wherein it is made abundantly clear

that the riser is of varying diameter. This fact is mentioned already in the abstract on the title page of the application, on page 13, line 8-10, in independent claim 1 as originally filed and independent claim 10 as originally filed.

In view of the above comments, the claimed invention would not have been obvious over Ellingson and Le Roi. Accordingly, withdrawal of the rejection is requested.


It is believed that this application is in condition for allowance. An early notice to this effect is earnestly solicited.

Respectfully submitted,



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